Crafting Victorian London:
The Environment Art and Material Pipelines of The Order: 1886

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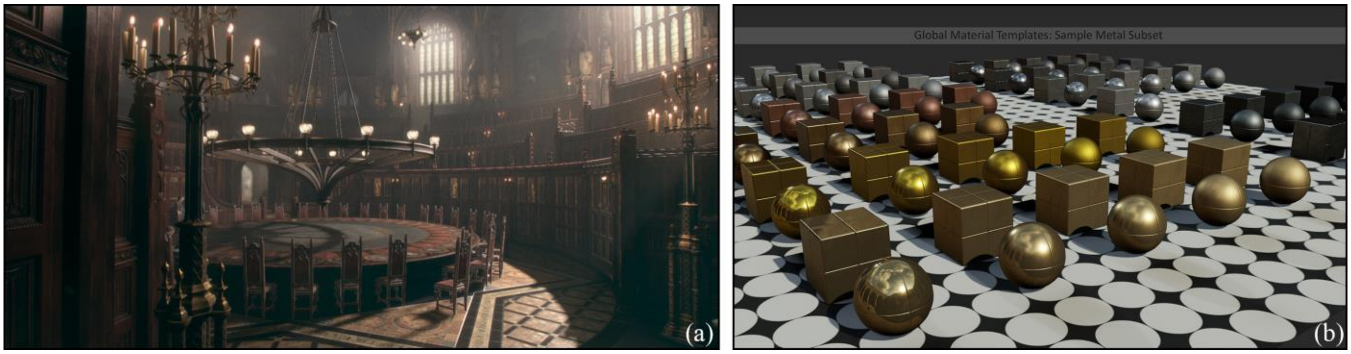

Figure 1: (a) Production environment from The Order: 1886, (b) sample subset of material template library.

Abstract

A few of the key environmental art pipeline goals on The Order: 1886 were to build a lighting and material model capable of capturing specular representation to a high degree of accuracy and to develop a surfacing and environment construction pipeline that allowed a larger team of artists to deliver consistently high quality assets across a diverse set of environments and props.

1 Material System

To achieve consistent quality in material shading response, and encourage the sharing of high quality assets across the project, our material system was based on a concept of a tiered hierarchy of asset libraries. At the base level we built a template library, consisting of materials with no texturing or per-pixel artistic variation, as highly abstracted 'scientific' samples of the shading response of the pure form, with incremental steps of wear.

At the second tier, the environment surfacing team was responsible for creating a much broader material library of common materials; referring to highly crafted tiling materials derived from 3D sculpts. The per-pixel shading of each of these common materials was defined using our material compositing system, maintaining an unbroken inheritance chain to the leaner library of base templates.

The most leaf-level of our material pipeline branched to specific level and custom prop and character materials. Each of these assets either directly inherited, or was texture composited, from the second tier common material library. This allowed artists to easily leverage an existing database of high quality materials, and further craft and localize them to the looks of their specific sets and props.

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SIGGRAPH 2015 Talks, August 09 – 13, 2015, Los Angeles, CA.
ACM 978-1-4503-3636-9/15/08.
http://dx.doi.org/10.1145/2775280.2775283

2 Environmental Modeling and Surfacing

Our environmental surfacing pipeline was built around achieving the highest quality result, with the lowest memory and performance overhead. To this end, our production environment surfacing relied on 90-95% tiling materials, with up to 4 runtime material layers authored using vertex blending, in conjunction with height maps for per-pixel, height aware effects. This pipeline was further extended with a run-time system of decal projectors, both for dynamic gameplay combat damage effects, as well as a toolset for environment artists to author gore, damage, and puddles that conformed to complex geometry in the world quickly and cheaply.

A number of standards were also employed on our modeling conventions to get the highest quality of dynamic and baked lighting results from a lower poly count, while also minimizing aliasing. Some of these techniques included a tiered system of beveling techniques by distance, a toolset for customizing vertex normal to maximize shading quality from lower poly counts, and a system of runtime instancing that supported any number of blending variants per instance, allowing environment artists to construct and material blend a world that appeared completely custom and unique, from the most minimal set of pieces.

3 Environmental Lighting and Rendering

With a filmic aesthetic relying on a lot of the defining forms of a composition coming from the specular response of surfaces, we made a large technical and artistic investment in developing a baked lighting system that could accurately capture specular as well as diffuse lighting. By the end of the project we were able to shift all of our light baking from a spherical harmonic representation to a spherical guassian method, allowing us to store per-texel, view dependent specular into a format supporting up to 12 directional lobes in the light maps. In the lighting pass, the engine would blend this lower frequency specular bake information in the light maps against more limited, but higher frequency cube map probes, with the blending threshold based on the per-pixel material roughness. This allowed us to achieve sharper, but less spatially accurate reflections on more mirror-like surfaces, while having a much more accurate and nuanced specular on rougher surfaces.